

Appl. No. 09/720,623  
AMENDMENT  
Docket No. MAEJ-136

### REMARKS

Claims 3, 6, 8-9, and 12-27 are pending. By this Amendment, Claims 22-27 are added. Support for the new claims is found in the specification at, *inter alia*, page 8, lines 1-10; page 10, lines 11-17; and in the Examples. No new matter is added by this Amendment.

#### I. REJECTION UNDER 35 U.S.C. 103(a)

Claims 3, 6, 8, and 12-21 were rejected under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 4,927,905 (Bogan) in view of WO 00/35988 (English language equivalent U.S. Patent No. 6,407,150; Mori et al.) or U.S. Patent No. 5,368,977 (Yoda et al.). Applicants note that Claim 9 is also pending and is assumed to be rejected. This rejection is respectfully traversed.

##### A. BOGAN IN VIEW OF MORI ET AL.

WO 00/35988 (Mori et al.) is not prior art with respect to the present application. WO 00/35988 (Mori et al.) was published on June 22, 2000, which is after the April 28, 2000 PCT filing date to which the present application is entitled and the April 30, 1999 priority date. Applicants respectfully reconsideration and withdrawal of this rejection. In addition, it appears that the Examiner relied upon Mori et al. and not Yoda et al. for the rejection of at least Claims 6 and 16. Thus, at least these claims should be indicated as allowable.

##### B. BOGAN IN VIEW OF YODA ET AL.

Bogan discloses that hydrocarbon aromatic hydroxyl-containing resins are prepared by: (1) reacting an unsaturated hydrocarbon with an aromatic hydroxyl-containing compound in the presence of a Lewis acid, (2) neutralizing the Lewis acid

Appl. No. 09/720,623  
AMENDMENT  
Docket No. MAEJ-136

with an inorganic base, and (3) removing the unreacted aromatic hydroxyl-containing compound (Abstract).

Bogan does not teach or suggest reacting a phenolic compound and dicyclopentadiene in the presence of an acid catalyst, wherein the concentration of moisture is maintained at 200 ppm or less, and wherein the dicyclopentadiene is added to the phenolic compound intermittently or continuously so that the molar fraction of the amount of ether product relative to that of the mixture of products may be 0.1 or more, as recited in Claim 12. Bogan does not teach or suggest using the molar fraction of the amount of ether product relative to that of the mixture of products as an index to adjust reaction temperature, retention time of reaction, catalyst concentration, or moisture content, depending upon the phenolic compound and dicyclopentadiene starting materials, as recited in Claim 22. Further, Bogan does not teach or suggest that the ratio of ortho/para is 2.0 or more with regard to the substitution position of the unsaturated cyclic hydrocarbon relative to a hydroxyl group of the phenolic compound in the hydrocarbon-phenol resin, as recited in Claim 3.

Yoda et al. does not overcome the deficiencies of Bogan. Yoda et al. discloses a positive type photosensitive resin composition containing: (a) a quinone diazido phenolic resin and (b) an alkali-soluble resin (Abstract). Yoda et al. discloses reducing the water content to below 100 ppm (col. 8, lines 19-22). Like Bogan, Yoda et al. does not teach or suggest reacting a phenolic compound and dicyclopentadiene in the presence of an acid catalyst, and wherein the dicyclopentadiene is added to the phenolic compound intermittently or continuously so that the molar fraction of the amount of ether product relative to that of the mixture of products may be 0.1 or more. Yoda et al. also does not teach or suggest: (1) using the molar fraction of the amount of ether product relative to that of the mixture of products as an index to adjust reaction conditions, or (2) that the ratio of ortho/para is 2.0 or more with regard to the substitution position of the

Appl. No. 09/720,623  
AMENDMENT  
Docket No. MAEJ-136

unsaturated cyclic hydrocarbon relative to a hydroxyl group of the phenolic compound in the hydrocarbon-phenol resin.

1. Standard for Obviousness Under 35 U.S.C. 103

The Examiner argues that "it is impossible that all of the systems suggested by the broader disclosure [of Bogan] would fail to produce the claimed outcome" (i.e., the molar fraction of the amount of ether product relative to that of the mixture of products may be 0.1 or more). However, the reference itself treats the systems equally and there is no reason to expect the claimed outcome which provides superior results.

The Examiner appears to invoke a per se rule of obviousness, holding that the claimed subject matter is obvious because Bogan broadly discloses the formation of hydrocarbon-aromatic hydroxyl-containing resins that might possibly embrace the claimed molar fraction of the amount of ether product relative to that of the mixture of products. However, the use of per se rules flouts section 103 and the fundamental case law applying it. In re Ochiai, 37 U.S.P.Q.2d 1127 (Fed. Cir. 1995). Per se rules that eliminate the need for fact-specific analysis of claims and prior art may be administratively convenient, but reliance on per se rules is legally incorrect. In re Baird, 29 U.S.P.Q.2d 1550 (Fed. Cir. 1994).

Regarding the Examiner's citation of Merck & Co. v. Biocraft Labs., the Federal Circuit has stated that:

We decline to extract from Merck the rule that ... regardless of how broad, a disclosure of a chemical genus renders obvious any species that happens to fall within it... Every case, particularly those raising the issue of obviousness under section 103, must necessarily be decided upon its own facts.

In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992). One of ordinary skill in the art would not have recognized or appreciated that the claimed molar fraction of the amount of ether

Appl. No. 09/720,623  
 AMENDMENT  
 Docket No. MAEJ-136

product relative to that of the mixture of products would have any effect on the color tone of the resin in view of the teachings of Bogan.

## 2. Comparison of Claimed Invention and Bogan et al.

As discussed in the specification, the claimed molar fraction of the amount of ether product relative to that of the mixture of products depends upon, *inter alia*, reaction temperature, retention time of reaction, catalyst concentration, or moisture content.

A comparison of the conditions of the present invention and those of Bogan are as follows:

	Present Application			Bogan (US 4,927,905)	
	Exam. 1	Exam. 3	Comp. Ex.1	Exam. 1	Exam. 2
PhOH	750 g (7.98 mol)	780 g (8.29 mol)	750 g (7.98 mol)	2714 g (28.84 mol)	55 lbs (265.7 mol)
Catalyst	2.3 g (0.0142 mol)	1.7 g (0.0105 mol)	9.0 g (0.0556 mol)	12.38 g (0.0873 mol)	113.55 g (.08 mol)
DCPD	150 g (1.136 mol)	120 g (0.909 mol)	150 g (1.136 mol)	381.3 g (2.88 mol)	7.68 lbs (26.4 mol)
PhOH/Catalyst (molar ratio)	562	790	144	330	332
PhOH/DCPD (molar ratio)	7.02	9.12	7.02	10.0	10.1
DCPD/Catalyst (molar ratio)	80.0	86.6	20.4	33.0	33.0
Initial Reaction Process temperature residence time	70°C 1 hr	70°C 1 hr	70°C 1 hr	70-85°C 1 hr	65-77°C 128 min.
Ether-type product (mol%)	0.43	0.31	0.03		

Bogan discloses that the molar ratio of catalyst to aromatic hydroxyl-containing compound (e.g., phenol) may be from 0.002:1 to about 0.1:1 (col. 4, lines 32-35). Thus,

Appl. No. 09/720,623  
AMENDMENT  
Docket No. MAEJ-136

the molar ratio of aromatic hydroxyl-containing compounds to catalyst is about 10 to 500:1. As shown in the Table above, the molar ratio of phenol/catalyst in Examples 1-2 of Bogan and Comparative Example 1 of the present application are within this molar ratio range. However, the molar ratio of phenol/catalyst of Examples 1 and 3 of the present invention are larger than 500:1.

The molar fraction of the amount of ether product relative to that of the mixture of products of the examples of Bogan may be estimated as follows. Factors participating in the reaction are considered to be the amounts of reactants (phenol (PhOH) and dicyclopentadiene (DCPD)) and catalyst, and the reaction conditions (e.g., temperature and residence time). When reaction conditions are constant, the composition of reaction product is influenced by the ratios PhOH/catalyst, PhOH/DCPD and DCPD/catalyst. The quantity of ether-type product may be represented by the following Formula (I):

$$\begin{aligned} \text{Quantity of ether-type product (molar \%)} = & \quad (I) \\ & a \times [\text{molar ratio of PhOH/catalyst}] \\ & + b \times [\text{molar ratio of PhOH/DCPD}] \\ & + c \times [\text{molar ratio of DCPD/catalyst}]. \end{aligned}$$

The coefficients may be obtained by substituting the values from Examples 1 and 3 and Comparative Example 1 of the present application for the respective ratios in Formula (I):

Coefficients:  $a = -0.00073$ ;  $b = -0.0151$ ;  $c = 0.0118$ .

Using Formula (I) and the coefficients, the molar fraction of ether-type product in Example 1 of Bogan is almost zero (-0.0025), which is far smaller than the claimed molar ratio of 0.1 or more. The residence time in Example 2 of Bogan is about twice as long as

Appl. No. 09/720,623

AMENDMENT

Docket No. MAEJ-136

that of Example 1. However, even with this length of residence time, it cannot be considered that the molar ratio of ether-type product exceeds the value of 0.1.

In view of the reaction conditions and the estimated molar fraction of ether-type product to mixture of products of Bogan, it cannot held that the broad disclosure of Bogan encompasses the claimed process or that the claimed process would be reasonably understood by one skilled in the art. Thus, it would not have been obvious for one of ordinary skill in the art to practice the claimed processes in view of the combined teachings of Bogan and Yoda et al. Reconsideration and withdrawal of the rejection are respectfully requested.

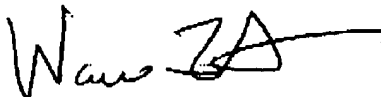
## II. CONCLUSION

In light of the foregoing remarks, this application is in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application.

Appl. No. 09/720,623  
AMENDMENT  
Docket No. MAEJ-136

If any fees are required or if there are any discrepancies in the fees please charge  
or credit our Deposit Account No. 501032 (Docket No. MAEJ-136).

Respectfully submitted,



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